

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-29 (Cancelled)

30. (Currently Amended) A film forming apparatus, comprising:

a reaction vessel evacuated by an evacuation system, said reaction vessel being adapted to hold therein a substrate to be processed;

a source bottle holding therein a source material of a film to be formed on said substrate, said source bottle forming a source gas therein as a result of vaporizing caused by a vaporizing gas;

a vaporizing gas line supplying said vaporizing gas to said source bottle ;

a source gas line supplying said source gas to said reaction vessel;

a diluting gas line connected to said source gas line at a first node located between said source bottle and said reaction vessel for diluting said source gas in said source gas line with a diluting gas supplied through said diluting gas line;

a bypass line connected to said source gas line at a second node;

a gas analyzer analyzing a concentration of said source gas in a mixed gas of said source gas and said diluting gas, said mixed gas flowing through said gas analyzer in a part located between said first node and said second node;

a first mass flow controller provided in said vaporizing gas line, said first mass flow controller controlling a flow rate of said vaporizing gas flowing through said vaporizing gas line;

a second mass flow controller provided in said diluting gas line, said second mass flow controller controlling a flow rate of said diluting gas flowing through said diluting gas line;

a controller provided with an output from said gas analyzer and controlling, in response thereto, said first mass flow controller and said second mass flow controller, such that a difference between said concentration of said source gas and a target concentration of said source gas is decreased; and

a ~~manometer~~ ~~pressure gauge~~ measuring a pressure of said mixed gas,

said gas analyzer comprising a gas concentration detection unit supplying a probe signal into said mixed gas, said gas concentration detection unit further producing a detection signal corresponding to said concentration of said source gas in said mixed gas based on said probe signal passed through said mixed gas,

said gas concentration detection unit further comprising a signal processing unit correcting said detection signal and calculating an absolute concentration of said source gas in said mixed gas,

said signal processing unit obtaining a flow rate S of said source gas from a value of Ir of said detection signal according to a relationship  $S = A \times Ir \times (1/P) \times C$ , A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said manometer, C being a total flow rate of said source gas and said vaporizing gas and said diluting gas.

said signal processing unit further calculating said absolute concentration of said source gas in said mixed gas ~~by multiplying, to a value Ir of said detection signal, a correction term  $A \times (1/P)$ , A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said pressure gauge according to the relationship  $S/C = A \times Ir \times (1/P)$ .~~

said controller configured to increase said flow rate of said diluting gas in the event said concentration of said source gas reaches an upper limit value, while maintaining said flow rate of said vaporizing gas constant,

said controller configured to decrease said flow rate of said diluting gas in the event said concentration of said source gas reaches a lower limit value, while maintaining said flow rate of said vaporizing gas constant .

31. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said source bottle holds said source material in the form of solid phase or liquid phase.

32. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said vaporizing gas comprises an inert gas and said diluting gas comprises an inert gas.

33. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said source gas flows through said source gas line together with said vaporizing gas as a carrier gas, said controller controlling said second mass flow controller, when controlling said first mass flow controller, such that a total flow rate in said source gas line is maintained constant.

34. (Canceled)

35. (Canceled)

36. (Canceled)

37. (Canceled)

38. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said bypass line is connected to said source gas line via a switching valve, said bypass line being connected to said evacuation system and bypassing said reaction vessel.

39. (Canceled)

40. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said source material has a vapor pressure of 266Pa or less at a work temperature thereof.

41. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said source gas comprises  $W(CO)_6$ .

42. (Previously Presented) The film forming apparatus as claimed in claim 30, wherein said gas analyzer comprises a Fourier transform infrared spectrometer.

43. (Canceled)

44. (Canceled)

45. (Canceled)

46. (Previously Presented) The film-forming apparatus as claimed in claim 30, wherein said manometer is provided at any of an upstream side and a downstream side of said gas analyzer.

47. (Canceled)

48 (Canceled)

49. (Previously Presented) The film-forming apparatus as claimed in claim 30, wherein said gas analyzer injects an infrared light to said source gas as said probe signal and produces said detection signal based upon an infrared absorption spectrum of said infrared light passed through said source gas.

50. (Previously Presented) The film-forming apparatus as claimed in claim 30 wherein said gas analyzer comprises a non-dispersion infrared spectrometer.

51. (Currently Amended) A source gas supply system of a film forming apparatus, said film forming apparatus comprising a reaction vessel adapted to hold therein a substrate to be processed and evacuated by an evacuation system, said source gas supply system comprising:

a source bottle holding therein a source material of a film to be formed on said substrate, said source bottle forming a source gas therein as a result of vaporizing caused by a vaporizing gas;

a vaporizing gas line supplying said vaporizing gas to said source bottle ;

a source gas line supplying said source gas to said reaction vessel;

a diluting gas line connected to said source gas line at a first node located between said source bottle and said reaction vessel for diluting said source gas in said source gas line with a diluting gas supplied through said diluting gas line;

a bypass line connected to said source gas line at a second node via a switching valve;

a gas analyzer analyzing a concentration of said source gas in a mixed gas of said source gas and said diluting gas, said mixed gas flowing through said gas analyzer in a part located between said first node and said second node;

a first mass flow controller provided in said vaporizing gas line, said first mass flow controller controlling a flow rate of said vaporizing gas flowing through said vaporizing gas line;

a second mass flow controller provided in said diluting gas line, said second mass flow controller controlling a flow rate of said diluting gas flowing through said diluting gas line; and

a controller provided with an output from said gas analyzer and controlling, in response thereto, said first mass flow controller and said second mass flow controller, such that a difference between said concentration of said source gas and a target concentration of said source gas is decreased ; and

a ~~manometer pressure gauge~~ measuring a pressure of said mixed gas,

said gas analyzer comprising a gas concentration detection unit supplying a probe signal into said mixed gas, said gas concentration detection unit further producing a detection signal corresponding to said concentration of said source gas in said mixed gas based on said probe signal passed through said mixed gas,

said gas concentration detection unit further comprising a signal processing unit correcting said detection signal and calculating an absolute concentration of said source gas in said mixed gas,

said signal processing unit obtaining a flow rate S of said source gas from a value of Ir of said detection signal according to a relationship  $S = A \times Ir \times (1/P) \times$

C, A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said manometer, C being a total flow rate of said source gas and said vaporizing gas and said diluting gas,

said signal processing unit further calculating said absolute concentration of said source gas in said mixed gas ~~by multiplying, to a value  $I_r$  of said detection signal, a correction term  $Ax(I/P)$ , A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said pressure gauge according to the relationship  $S/C = A \times I_r \times (1/P)$ ,~~

said controller configured to increase said flow rate of said diluting gas in the event said concentration of said source gas reaches an upper limit value, while maintaining said flow rate of said vaporizing gas constant,

said controller configured to decrease said flow rate of said diluting gas in the event said concentration of said source gas reaches a lower limit value, while maintaining said flow rate of said vaporizing gas constant.

52. (Canceled)

53. (Currently Amended) A film forming apparatus, comprising:

a reaction vessel evacuated by an evacuation system, said reaction vessel being adapted to hold therein a substrate to be processed;



a source bottle holding therein a source material of a film to be formed on said substrate, said source bottle forming a source gas therein as a result of vaporizing caused by a vaporizing gas;

a vaporizing gas line supplying said vaporizing gas to said source bottle;

a source gas line supplying said source gas to said reaction vessel;

a diluting gas line connected to said source gas line at a first node located between said source bottle and said reaction vessel for diluting said source gas in said source gas line with a diluting gas supplied through said diluting gas line;

a bypass line connected to said source gas line at a second node,

a gas analyzer analyzing a concentration of said source gas in a mixed gas of said source gas and said diluting gas, said mixed gas flowing through said gas analyzer in a part located at a downstream side of said second node;

a first mass flow controller provided in said vaporizing gas line, said first mass flow controller controlling a flow rate of said vaporizing gas flowing through said vaporizing gas line;

a second mass flow controller provided in said diluting gas line, said second mass flow controller controlling a flow rate of said diluting gas flowing through said diluting gas line;

a controller provided with an output from said gas analyzer and controlling, in response thereto, said first mass flow controller and said second

mass flow controller, such that a difference between said concentration of said source gas and a target concentration of said source gas is decreased,

a ~~manometer~~ ~~pressure gauge~~ measuring a pressure of said mixed gas,

said gas analyzer comprising a gas concentration detection unit supplying a probe signal into said mixed gas, said gas concentration detection unit further producing a detection signal corresponding to said concentration of said source gas in said mixed gas based on said probe signal passed through said mixed gas,

said gas concentration detection unit further comprising a signal processing unit correcting said detection signal obtained with said gas concentration detection unit based upon a pressure of said mixed gas and calculating an absolute concentration of said source gas in said mixed gas,

said signal processing unit obtaining a flow rate S of said source gas from a value of Ir of said detection signal according to a relationship  $S = A \times Ir \times (1/P) \times C$ , A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said manometer, C being a total flow rate of said source gas and said vaporizing gas and said diluting gas,

said signal processing unit further calculating said absolute concentration of said source gas in said mixed gas ~~by multiplying, to a value Ir of said detection signal, a correction term  $A \times (1/P)$ , A being a constant obtained by experiment, P being a pressure of said mixed gas obtained by said pressure gauge according to the relationship  $S/C = A \times Ir \times (1/P)$ ,~~

said controller configured to increase said flow rate of said diluting gas in the event said concentration of said source gas reaches an upper limit value, while maintaining said flow rate of said vaporizing gas constant,

said controller configured to decrease said flow rate of said diluting gas in the event said concentration of said source gas reaches a lower limit value, while maintaining said flow rate of said vaporizing gas constant.

54. (Previously Presented) The film forming apparatus as claimed in claim 53, wherein said gas analyzer is provided between said second node and said reaction vessel.

55. (Previously Presented) The film forming apparatus as claimed in claim 53, wherein said gas analyzer is provided in said bypass line.